**FLUORESCENT SCREEN WITH METAL BACK, AND METHOD OF PRODUCING THE SAME**

Examiner: Slawski S.N.: 10/551,758 Art Unit: 4191 December 10, 2007

***Claim Rejections – 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 2, 4, and 5 are rejected as unpatentable over Ito et al. (WO 01/57905) in view of Ohno et al. (WO 02/099831). (Subsequent references to Ito et al. WO 01/57905 and to Ohno et al. WO 02/099831 are based on corresponding US 6,841,926 and US 7,179,572, respectively.)

Regarding Claim 1, Ito et al. disclose a method of forming a metal back layer on a phosphor screen, comprising forming a phosphor layer on a face plate, then transferring a metal film via a transfer film comprising a base film, metal film, and adhesive layer, where the metal film contacts the phosphor layer througth the adhesive layer. The transfer film is adhered to the phosphor layer by pressing, after which the base film is peeled (col. 3, L. 5-14). Adhesion of the transfer film **6** to the phosphor layer **8** is achieved by pressing with a roller **7** (Fig. 2B; col. 5, L. 34-36). The roller is heated to 200°C and is moved at a pressing rate of 2 m/min. (col. 5, L. 46-50).

However, Ito et al. do not teach a second heating and pressing of the metal film by a press roller.

Ohno et al. teach a method of forming a fluorescent screen via a transfer sheet comprising adhesive layers and fluorescent substance layers, which is applied to the inner surface of the panel of a carthode-ray tube on which light-absorbing carbon stripes have been formed, and which is then joined to said panel by a roller applying heat and pressure (col. 2, L. 4-14). Ohno et al. teach that after at least one color layer of phosphor stripe **52B** has been applied between light-absorbing stripes **51**, a single pass in one direction by roller **5** will leave gaps **90** between the transfer film and the phosphor stripes **52B** on the stepped portions extended in the direction in which the roller proceeds (Fig. 7A; col. 14, L. 50-67; col. 15, L. 1-18). If, however, the roller makes a second pass upon the transfer film in the opposite direction, these gaps can be closed and hence the transfer film can be uniformly joined to the whole surface of the panel (Fig. 7B; col. 15, L. 18-26).

Ito et al. teach that their transfer film is similarly disposed upon multiple color layers of phosphor stripes between light-shielding stripes (col. 17, L. 27-35). Therefore, it would have been obvious to one having ordinary skill in the art to apply the second, reverse pass with the roller described by Ohno et al. onto the transfer method of Ito et al., because Ohno et al. teach that such back-and-forth motion of the roller eliminates gaps between the transfer film and phosphor stripes and enables uniform bonding of the transfer layers across the panel surface.

Finally, Ohno et al. teach that the moving speed of the roller can be held constant as it moves back and forth across the transfer film, and that said moving speed affects the degree of adhesion achieved between the transfer film and panel (col. 15, L. 35-41, L. 44-47). Ohno et al. also teach that before each passage across the transfer film the entire roller should be heated to a uniform control temperature (col. 8, L. 25-26, L. 34-36; col. 11, L. 6-11). Therefore, it would have been obvious to one having ordinary skill in the art to conduct the reverse pass of the roller taught by Ohno et al. at the same temperature and moving speed taught by Ito et al., i.e. 200°C and 2 m/min., because Ohno et al. teach that the roller should be reheated to the control temperature after each pass, and because Ohno et al. teach that the moving speed affects adhesion and should therefore be kept constant to achieve uniform bonding.

Regarding Claim 2, Ito et al. teach a base film of the transfer film having a thickness of 20 μm (col. 17, L. 11-15).

Regarding Claim 4, Ohno et al. teach the use of a transfer roller **5** having a notch **16**, where the transfer roller is formed so as to bond the entire transfer foil by rotating once from one end to the other end of the notch (Fig. 8a; col. 9, L. 9-14). Ohno et al. also teach that the heat transfer roller must be uniformly reheated to the desired control temperature before each pass across the transfer film (col. 8, L. 25-26, L. 34-36; col. 11, L. 6-11). Thus it would have been obvious to one having ordinary skill in the art to apply a transfer roller having a circumference equal to or longer than the length of the transfer film along the pressing direction, because Ohno et al. suggest that a roller with such

dimensions combined with uniform reheating of the roller between passes allows the entire length of the transferred layers to be uniformly bonded at the same temperature.

Regarding Claim 5, Ohno et al. teach the use of the same roller in the initial film transfer step as in the second pressing step, as described above. Therefore, Ohno et al. motivate both a transfer roller and a press roller having a circumference equal to or longer than the length of the transfer film along the pressing direction.

3. Claims 3 and 8 are rejected as unpatentable over Ito et al. (WO 01/57905) and Ohno et al. (WO 02/099831) as applied to Claims 1 and 2 above, and further in view of Tanaka et al. (WO 02/37522). (Subsequent references to Tanaka et al. WO 02/37522 are based on corresponding US 6,833,663.)

Ito et al. in view of Ohno et al. teach a method of forming a metal back-attached phosphor screen according to Claims 1 and 2 (see Paragraph 1 above). Ohno et al. teach that the pressure applied to the roller can be held constant as it moves back and forth across the transfer film, and that said pressure affects the degree of adhesion achieved between the transfer film and panel (col. 15, L. 27-32, L. 44-48). However, Ito et al. and Ohno et al. do not specifically teach such a method wherein the pressing force of the transfer roller is 300 to 800 $kg_f/cm^2$, and the pressing force of the press roller is 500 to 1000 $kg_f/cm^2$. Tanaka et al. teach the application of a metal back onto a phosphor screen via a transfer film having a base film, a metal layer, and an adhesive layer (col. 2, L. 12-22). In one example of the method of Tanaka et al., the transfer was achieved using a rubber roller under a pressure force of 500 $kg/cm^2$ (col. 7, L. 32-40).

This pressure resulted in a degree of adhesion between the metal back layer and the phosphor layer of about 70% (col. 7, L. 45-48). Tanaka et al. teach that a degree of adhesion of 30% or more is considered high and will result in a satisfactorily high brightness retention rate for the field effect display device (col. 9, L. 14-19). Therefore it would have been obvious to one having ordinary skill in the art to apply the pressing force of 500 kg/cm$^2$ taught by Tanaka et al. onto both the forward and reverse passes of the roller in the transfer method of Ito et al. and Ohno et al., because Ohno et al. suggest that a constant pressure on the roller as it moves back and forth will achieve a uniform degree of adhesion of the transfer film to the panel, and because Tanaka et al. teach that a pressing force of 500 kg/cm$^2$ upon the roller results in a high degree of adhesion and a satisfactory display device.

4. Claims 6 and 7 are rejected as unpatentable over Ito et al. (WO 01/57905) and Ohno et al. (WO 02/099831) as applied to Claim 1 above, in view of Horvath (US 4,728,386), and further in view of Isogai et al. (US 5,177,552).

Regarding Claim 6, Ito et al. in view of Ohno et al. teach a method of forming a metal back-attached phosphor screen according to Claim 1 (see Paragraph 1 above). Ohno et al. teach that a silicon rubber having a hardness of about 70° to 90° is an appropriate material for the thermal transfer roller (col. 9, L. 4-8). However, Ohno et al. do not teach the use of a such a rubber roller having a metal core. Horvath teaches a method of adhering a film **22** to a glass sheet **12** by heating and pressing with a metal roller **18** having a 19-mm-thick rubber covering **19** (Abstract; Fig. 1; col. 2, L. 40-50). A

well-known advantage of such construction is that the conductive metal core allows the roller to be heated internally and uniformly, as evidenced by Isogai et al. (col. 1, L. 12-16; col. 3, L. 19-23). Ohno et al. teach that such internal heating is a viable option for the thermal transfer roller (col. 8, L. 37-40). Therefore, it would have been obvious to one having ordinary skill in the art to use a rubber transfer roller with 19-mm-thick rubber having a hardness of 70 to 90° on a metal core, because Ohno et al. and Horvath teach that such an embodiment is appropriate to laminating films to glass panels as in the manufacture of a display device, and because Ohno et al. teach that the internal heating this embodiment enables is an effective means of regulating the thermal transfer roller's temperature.

Regarding Claim 7, Ohno et al. teach the use of the same roller in the initial film transfer step as in the second pressing step (see Paragraph 1 above). Therefore, Ohno et al. and Horvath teach both a transfer roller and a press roller with 19-mm-thick rubber having a hardness of 70 to 90° on a metal core.

***Art of Record***

5. The following prior art is made of record: Imai et al. (US 5,571,766) teach a transfer-film method comprising transferring a dye-receiving layer **14** on a substrate (i.e. base film) **8** to a an image-receiving member **3** via transfer rollers **10** and **11**, peeling the base film **8**, then fixing the transferred dye-receiving layer **17** to the image-receiving layer **3** via press rollers **15** and **16**. One of said transfer rollers comprises a metal core clad with 5-mm-thick rubber heated internally to about 180°C (Fig. 1; col. 3., L. 19-34;

col. 14, L. 1-19). Miura et al. (US 2002/0024287) teach a method of manufacturing a cathode-ray tube by application of a transfer foil to the inner side of the cathode-ray tube's panel [0044].

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BRIAN R. SLAWSKI whose telephone number is (571)270-3855. The examiner can normally be reached on Monday to Thursday, 7:30 a.m. to 5:00 p.m. ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan, can be reached on (571) 272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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